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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/856,924	05/30/2001	Nobuaki Hashimoto	109681	6373

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EXAMINER

TRAN, TAN N

ART UNIT	PAPER NUMBER
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2826

DATE MAILED: 11/06/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/856,924

Applicant(s)

HASHIMOTO ET AL.

Examiner

TAN N TRAN

Art Unit

2826

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 18 September 2002.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-33 is/are pending in the application.
- 4a) Of the above claim(s) 20-32 is/are withdrawn from consideration.
- 5) ☒ Claim(s) 7-9 and 13-15 is/are allowed.
- 6) ☒ Claim(s) 1-6, 10-12, 16-19 and 33 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other:

DETAILED ACTION

Election/Restriction

1. Applicant's election with traverse of Group II, claims 1-19 in Paper No. 12 is acknowledge. The traversal is on the ground(s) that "the restriction requirement does not specifically identify what "materially different product" can be made by the process of the claimed invention", and "the subject matter of all claims 1-32 is sufficiently related that a thorough search for the subject matter of any one Group of claims would encompass a search of the subject matter of the remaining claims", and "the search and examination of the entire application could be made without serious burden". These are not found persuasive because: a/ the materially different product is the product having the member has properties which repel the resin at least in a region facing the holes in the substrate as recited in claim 25, and a first step of bonding a first conductive wire to one of the electrodes of the semiconductor chip and cutting the bonded first conductive wire with part of the first conductive wire to remain on one of the electrodes; and a second step of forming a first bump by pressing the remaining part of the first conductive wire on the electrode; and a third step of bonding a second conductive wire to the first bump and cutting the bonded second conductive wire with part of the second conductive wire to remain on the first bump and a fourth step of forming a second bump by pressing the remaining part of the second conductive wire on the first bump as recited in claim 30 Not that the product of Group II invention does not have the member has properties which repel the resin at least in a region facing the holes in the substrate as recited in claim 25, and a first step of bonding a first conductive wire to one of the electrodes of the semiconductor chip and cutting the

bonded first conductive wire with part of the first conductive wire to remain on one of the electrodes; and a second step of forming a first bump by pressing the remaining part of the first conductive wire on the electrode; and a third step of bonding a second conductive wire to the first bump and cutting the bonded second conductive wire with part of the second conductive wire to remain on the first bump and a fourth step of forming a second bump by pressing the remaining part of the second conductive wire on the first bump as recited in claim 30.

b/Additionally, the search is not coextensive as evidenced by the different fields of search for the process and product as cited in the previous restriction requirement. Therefore, the election requirement is made final.

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1-5, 10, 11, 17 are rejected under 35 U.S.C. 102(b) as being anticipated by Otsuka (US 5,949,142).

With regard to claim 1, Otsuka discloses a substrate 4 including a plurality of holes and a surface over which an interconnecting pattern 4b is formed, part of the interconnecting pattern 4b being superposed over the holes; a semiconductor chip 2 disposed over another surface of the substrate 4 and including a plurality of electrodes to be positioned over the holes; and conductive posts (4a,4c) comprise interlevel conductive bump provided on the electrode 2a within the holes to be electrically connect to the interconnecting pattern 4b. (Note lines 67, column 4 and lines 1-5, column 5, figs 1, 3 of Otsuka)

With regard to claim 2, Otsuka discloses a resin 6 is provided between the substrate 4 and the semiconductor chip 2. (Note figs 1, 3 of Otsuka).

With regard to claim 3, Otsuka discloses the resin is an anisotropic conductive material 6 containing conductive particles 6a. (Note lines 13-17, column 4, figs 1, 3 of Otsuka).

With regard to claim 4, Otsuka discloses the part of the interconnecting 4b closes the holes. (Note figs 1, 3 of Otsuka).

With regard to claim 5, Otsuka discloses the interconnecting pattern 4b includes a plurality of interconnecting lines; and wherein two or more interconnecting lines extend over each of the holes.

With regard to claim 10, Otsuka discloses the conductive post (4a, 4c) are a plurality of layered bumps. (Note figs 1, 3 of Otsuka).

With regard to claim 11, Otsuka discloses the bumps (4a, 4c) include first bumps 4a formed on the electrodes and second bumps 4c formed on the first bumps 4a. (Note figs 1, 3 of Otsuka).

With regard to claim 17, Otsuka discloses the semiconductor chip is mounted face-down to the substrate. (Note figs 1, 3 of Otsuka).

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 6, 12, 16, 18, 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Otsuka (US 5,949,142).

With regard to claim 6, Otsuka discloses all claimed invention as in claim 1, except the other surface of the substrate 4 is roughed. However, it would have been obvious to one of ordinary skill in the art to form Otsuka's case having surface of the substrate 4 is roughed because such element 4 is conventional in the art in order to make the resin 6 is more stable.

With regard to claim 12, Otsuka discloses all claimed invention as in claims 1 and 10, except at least the first bumps are ball bumps. However, it would have been obvious to one of ordinary skill in the art to form Otsuka's case having at least the first bumps are ball bumps in order to form the conductive particles in a thermosetting resin for electrically connecting to the semiconductor chip via an insulating layer more easy.

With regard to claim 16, Otsuka discloses all claimed invention as in claims 1 and 11, except the first bumps and the second bumps are formed of the same material. However, it would

have been obvious to one of ordinary skill in the art to form Otsuka's case having the first bumps and the second bumps are formed of the same material in order to simplify the processing steps.

With regard to claims 18 and 19, Otsuka discloses all claimed invention as in claim 1, except a circuit board and electronic instrument provided with the semiconductor device. However, it would have been obvious to one of ordinary skill in the art to form Otsuka's case on a circuit board or an electronic instrument provided with the semiconductor device because such structure is conventional in the art for forming the semiconductor integrated circuit package.

Claim 33 is rejected under 35 U.S.C. 103(a) as being unpatentable over Otsuka (US 5,949,142) in view of Kim et al. (2002/0003308).

Otsuka does not disclose there is a space between each of the conductive posts and an inner surface of each of the holes.

However, Kim et al. discloses there is a space between a conductive post 33 and an inner surface of each of the holes 22. (Note fig. 9 of Kim et al.).

Therefore, it would have been obvious to one of ordinary skill in the art to form the Otsuka's device having there is a space between each of the conductive posts and an inner surface of each of the holes such as taught by Kim et al in order to reduce warpage of the package.

Allowable Subject Matter

4. Claims 7-9, 13-15 are allowable over the prior art of record, because none of these references disclose or can be combined to yield the claimed invention such as a recognition hole is formed in the substrate at position differing from the holes; and wherein a recognition pattern is formed over the recognition hole on the side of a surface of the substrate including the interconnecting pattern in claim 7, and the second bumps are formed of a metal which has a melting point lower than the melting point of the first bumps in claim 13.

Response to Arguments

5. Applicant's arguments filed 09/18/02 have been fully considered but they are not persuasive.

It is argued, at page 4 of the remarks, that "Otsuka does not disclose or suggest a semiconductor device, including at least conductive posts provided on the electrodes and within the holes to be electrically connected to the interconnecting pattern". However, lines 67, column 4, lines 1-5, column 5, and figs 1, 3 of Otsuka do show at least conductive posts (4a,4c) provided on the electrodes 2a and within the holes to be electrically connected to the interconnecting pattern 4b. Thus, Applicant's claim 1 does not distinguish over Otsuka reference.

Election/Restrictions

6. This application contains claims 20-32 drawn to an invention nonelected with traverse in Paper No. 12. A complete reply to the final rejection must include cancelation of nonelected claims or other appropriate action (37 CFR 1.144) See MPEP § 821.01.

Conclusion

7. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a). A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

6. Any inquiry concerning this communication or earlier communication from the examiner should be directed to Tan Tran whose telephone number is (703) 305-3362. The examiner can normally be reached on M-F 8:30AM-5PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nathan Flynn can be reached on (703) 308-6601. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 308-7722 for regular communications and (703) 308-7724 for after final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

TT

Oct 2002


Minh Loan Tran
Primary Examiner